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Doppelfernrohr mit Mitteltrieb und einem Zahnradgetriebe

Anmelder:

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Die Erfindung bezieht sich auf Doppelfernrohre mit Mitteltrieb, bei denen die beiden Okularttransporthülsen undrehbar mit dem Fernrohrkörper verbunden sind und wahlweise beide oder nur eine der Hülsen mit Hilfe des Mitteltriebes und eines Zahnradgetriebes zur Einstellung der Bildschärfe in Längsrichtung verstellbar sind.

Bei Fernrohren dieser bekannten Art sind zwischen einem auf der Triebwelle befindlichen Triebrad und an den Okularttransporthülsen vorgesehenen Zahnkränzen Zwischenräder angeordnet, welche unmittelbar in den beiden zugeordneten Systemhälften gelagert sind. Sind sämtliche Zahnräder miteinander im Eingriff, findet beim Drehen des Triebknopfes eine gleichzeitige Verstellung beider Okulare in Längsrichtung statt. Soll jedoch nur ein Okular verstellt werden, wird die Drehung des Triebrades auf die andere Okulartransporthülse unterbunden. Nach einem bekannten Vorschlag kann hierzu eines der Zwischenräder in axialer Richtung verschoben werden, wodurch sein Eingriff in das Triebzahnrad unterbrochen wird und die Drehung des Triebknopfes nur auf die eine der Okulartransporthülsen übertragen wird.

Bei diesen bekannten Fernrohren mit Zahnradgetriebe hat es sich gezeigt, daß beim Schwenken der beiden Systemhälften um die gemeinsame Achse zum Einstellen des richtigen Augenabstandes die ursprüngliche Okulareinstellung sich ändern kann. Das Triebrad bleibt beim Schwenken der beiden Systemhälften normalerweise in bezug auf Zwischenrad und Zahnkranz der Okulartransporthülse der einen Systemhälfte unverändert, d. h. es bleibt trotz der Schwenkung stehen. Das Zwischenrad der anderen Systemhälfte führt aber, weil das Triebrad stehenbleibt, zwangläufig eine der Schwenkbewegung entgegengesetzte Drehbewegung aus und betätigt dabei den Zahnkranz der anderen Okulartransporthülse, wodurch das entsprechende Okular verstellt wird. Dadurch entsteht zwischen den beiden Okularen eine ungleiche Einstellung, und es ist nach jeder Verstellung des Augenabstandes eine nachträgliche Korrektur notwendig.

Aufgabe der Erfindung ist es, diese Korrektur auszuschalten, so daß beim Schwenken der beiden Systemhälften die vorgenommene Okulareinstellung unverändert erhalten bleibt. Um dies zu erreichen, wird erfindungsgemäß vorgeschlagen, wenigstens eines der Zahnräder des Zahnradgetriebes so anzuordnen, daß es beim Schwenken einer oder beider Systemhälften des Fernrohres lose abrollt, ohne eine Drehung eines oder mehrerer mit ihm im Eingriff stehender Zahnräder hervorzurufen. Zweckmäßig wird hierzu ein Zwischenrad des Zahnradgetriebes um die Mittelachse einer der Okulartransporthülsen schwenkbar angeordnet, so daß es beim Verschwenken der Systemhälften zwischen zwei Zahnrädern des Getriebes abrollt. Nach einem Vorschlag der Erfindung wird das zu verschwenkende Zahnrad auf einem besonderen, an der einen Systemhälfte angeordneten Träger gelagert, der mittels eines an der anderen Systemhälfte befestigten Steuerkörpers um die eine der Okulartransporthülsen entgegen der Schwenkrichtung dieser Okulartransporthülse schwenkbar ist und die gegenläufige Bewegung des Zahnrades ausgleicht, wodurch dieses, ohne eine Drehung der mit ihm im Eingriff stehenden Zahnräder zu bewerkstelligen, abrollt.

Einzelheiten und weitere Merkmale der Erfindung ergeben sich aus der nachfolgenden Beschreibung eines in der Zeichnung dargestellten bevorzugten Ausführungsbeispiels. Es zeigt in schematischer Darstellung

Fig. 1 das Getriebe in Draufsicht beim größten Augenabstand,

Fig. 2 das Getriebe in Draufsicht beim kleinsten Augenabstand und

Fig. 3 das Getriebe, von vorn gesehen.

Die beiden Systemhälften **1** und **2** des Doppelfernrohres sind mittels einer Hohlachse **3** drehbar bzw. schwenkbar miteinander verbunden. Die Hohlachse **3** ist in der rechten Systemhälfte **2** so fest angeordnet, daß die Systemhälfte **1** sich um diese Achse **3** drehen muß. Eine Triebwelle **4** mit Triebknopf **5** und Triebrad **6** ist in der Hohlachse **3** mit Reibung drehbar gelagert. Beim Drehen des Knopfes **5** werden mit den Zahnkränzen **8** und **11** über den beiden Zwischenrädern **7** und **10** die beiden Okulartransporthülsen **9** und **12** angetrieben, die in bekannter Weise mittels Schneckengang eine gleich große axiale Verschiebung der beiden Okulare hervorrufen.

Zur Einzeleinstellung der Okulare kann das Zwischenrad **10** in axialer Richtung, z. B. nach oben,

verschoben werden, wodurch die Verbindung zwischen Triebrad 6 und Zahnkranz 11 unterbrochen ist und eine Drehung des Triebrades 6 nur auf den Zahnkranz 8 übertragen wird. Da die Hohlachse 3 und auch die Zahnräder 6 und 10 ortsfest in der rechten Systemhälfte 2 gelagert sind, behalten die Räder 6, 10 und 11 auch beim Schwenken der linken Systemhälfte 1 ihre ursprüngliche Stellung bei.

Ist nun auch das Zwischenrad 7 an der dazugehörigen Systemhälfte 1 ortsfest gelagert, so wird es beim Schwenken dieser Systemhälfte 1 zwangläufig eine gegenläufige Drehbewegung ausführen und damit das linke Okular über den in das Zwischenrad 7 eingreifenden Zahnkranz 8 und Schneckengang axial verschieben. Hierdurch stimmt die linke Okulareinstellung mit der rechten Okulareinstellung nicht mehr überein. Es muß also Sorge getragen werden, daß dieses Zwischenrad 7 beim Schwenken der Systemhälften 1 und 2 keine Drehung des Zahnkranzes 8 hervorruft. Erreicht wird dies nun dadurch, daß das Zwischenrad 7 so gelagert wird, daß es zwischen dem Triebrad 6 und dem Zahnkranz 8 abrollen kann. Zu diesem Zweck wird das Zwischenrad 7 an einem Träger 13 gelagert, der von der Okulartransporthülse 9 ausgeht und sich zur Hohlachse 3 erstreckt. Mit seinem der Okulartransporthülse zugekehrten Ende umgreift er diese gabelförmig, zweckmäßig in einer Ringnut, unterhalb des Zahnkranzes 8, und ist somit um die Mittelachse 16 der Okulartransporthülse 9 schwenkbar. Mit seinem anderen Ende wirkt der Träger 13 mit einem Steuerkörper 15 kraft- oder formschlüssig zusammen, der mit der rechten Systemhälfte 2 starr in Achsrichtung der Hohlachse 3 verbunden ist. Besonders vorteilhaft ist es, wenn der Träger 13 vom Steuerkörper 15 über eine Verzahnung beeinflußt wird. Das freie Ende des Trägers 13 erhält hierzu eine Verzahnung 14, die in die Verzahnung eines Zahnrades, zu dem in diesem Fall der Steuerkörper 15 ausgebildet ist, eingreift. Die beiden ineinandergreifenden Verzahnungen des Trägers 13 und des Steuerkörpers 15 sind so aufeinander abgestimmt, daß beim Schwenken der linken Systemhälfte um die Hohlachse 3 das

Zwischenrad 7 sich zwischen Triebrad 6 und Zahnkranz 8 abrollen kann, ohne letztere mitzunehmen. Auf diese Weise behalten beim Schwenken der beiden Systemhälften die beiden Okulare ihre ursprüngliche Einstellung unverändert bei.

Patentanspruche:

1. Doppelfernrohr mit Mitteltrieb und einem Zahnradgetriebe, bestehend aus einem mit der Triebwelle fest verbundenen Zahnrad, je einem Zwischenrad und je einem mit den Okulartransporthülsen verbundenen Zahnkranz zur Einstellung der Bildschärfe, dadurch gekennzeichnet, daß wenigstens eines der Zwischenräder (7, 10) um die Mittelachse (16) einer Okulartransporthülse (9, 12) verschwenkbar angeordnet ist, so daß es beim Schwenken einer oder beider Systemhälften (1, 2) des Fernrohres lose zwischen dem Triebrad (6) und dem benachbarten Zahnkranz (8, 11) der Okulartransporthülse (9, 12) abrollt.

2. Doppelfernrohr nach Anspruch 1, dadurch gekennzeichnet, daß das zu verschwenkende Zwischenzahnrad (z. B. 7) auf einem an der einen Systemhälfte (1) um die Mittelachse (16) der Okulartransporthülse (9) schwenkbar angeordneten Träger (13) gelagert ist, der mit einem an der anderen Systemhälfte (2) fest angeordneten Steuerkörper (15) kraft- oder formschlüssig verbunden ist.

3. Doppelfernrohr nach Anspruch 2, dadurch gekennzeichnet, daß der Träger (13) als Schwenkhebel mit einem zur Okulartransporthülse (9) hinweisenden gabelförmigen Ende ausgebildet und mit diesem Ende in eine Ringnut der Okulartransporthülse um deren Achse (16) drehbar eingesetzt ist und an seinem zur Triebwelle (4) des Fernrohres hinweisenden Ende mit einer Verzahnung (14) versehen ist, die in die entsprechende Verzahnung eines als Steuerkörper (15) dienenden Zahnrades eingreift, das koaxial mit der Hohlachse (3) fest mit der anderen Systemhälfte (2) verbunden ist.

Hierzu 1 Blatt Zeichnungen

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AUSGABETAG: 30. OKTOBER 1958

DAS 1 042 265
KL. 42h 12/03
INTERNAT. KL. G 02d

Fig. 1

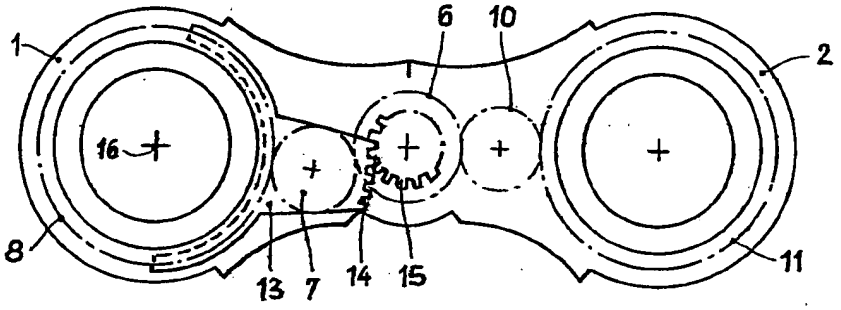


Fig. 2

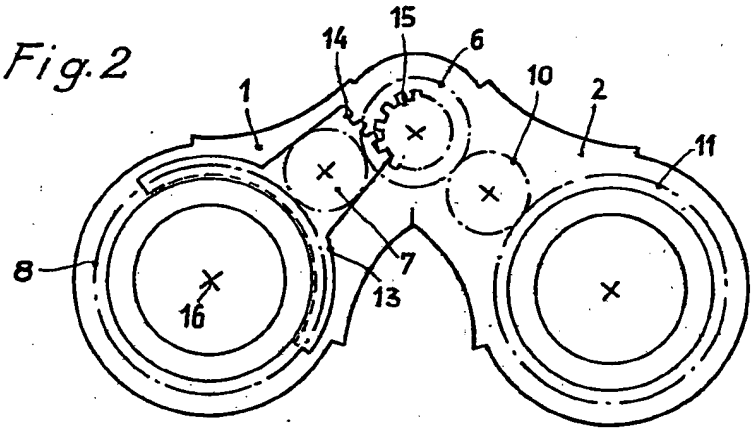
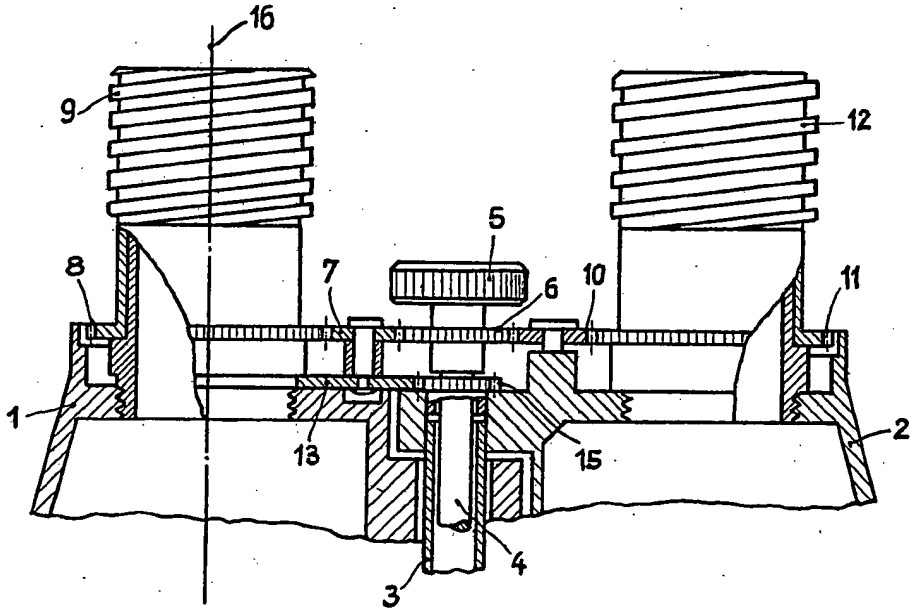


Fig. 3



German Laid-open specification 1 042 265

Binoculars with centre drive and a gear mechanism

The invention relates to binoculars with centre drive, in which the two eyepiece transport sleeves are non-rotatably connected to the telescope body and optionally both or only one of the sleeves can be adjusted in the longitudinal direction with the aid of the centre drive and a gear mechanism in order to adjust the sharpness of the image.

In binoculars of this type, intermediate gears are arranged between a drive wheel located on the drive shaft and toothed rings provided on the document transport sleeves, the said intermediate gears being mounted in the two associated system halves. If all the gears are engaged with one another, a simultaneous adjustment of the two eyepieces in the longitudinal direction takes place when the drive knob is rotated. However, if only one eyepiece is to be adjusted, the rotation of the drive wheel for the other eyepiece transport sleeve is suppressed. According to a known proposal, one of the intermediate gears can be displaced in the axial direction for this purpose, by which means its engagement in the drive gear is interrupted and the rotation of the drive knob is transmitted to only one of the eyepiece transport sleeves.

In the case of the known binoculars with a gear mechanism, it has been shown that, when the two system halves are pivoted about the common axis in order to adjust the correct eye spacing, the original eyepiece adjustment can change. As the two system halves are pivoted, the drive gear normally remains unchanged in relation to the intermediate gear and toothed ring of the eyepiece transport sleeve of the one system half, that is to say it remains stationary despite the

pivoting. However, because the drive gear remains stationary, the intermediate gear of the other system half necessarily carries out a rotational movement opposed to the pivoting movement and, in the process, actuates the toothed ring on the other eyepiece transport sleeve, which means that the corresponding eyepiece is adjusted. As a result, an unequal adjustment is produced between the two eyepieces and a subsequent correction is necessary after each adjustment of the eye spacing.

The object of the invention is to rule out this correction so that, when the two system halves are pivoted, the eyepiece adjustment that has been carried out is maintained unchanged. In order to achieve this, according to the invention it is proposed to arrange at least one of the gears of the gear mechanism in such a way that it rolls loosely during the pivoting of one or both system halves of the binoculars without causing any rotation of one or more gears in engagement therewith. For this purpose, an intermediate gear of the gear mechanism is expediently arranged such that it can be pivoted about the central axis of one of the eyepiece transport sleeves, so that it rolls between two gears of the mechanism when the system halves are pivoted. According to a proposal of the invention, the gear to be pivoted is mounted on a special carrier which is arranged on one system half, which can be pivoted about one of the eyepiece transport sleeves, counter to the pivoting direction of this eyepiece transport sleeve, by means of a control element fixed to the other system half and compensates for the opposite movement of the gear, as a result of which the latter rolls without bringing about any rotation of the gears in engagement therewith.

Details and further features of the invention emerge from the following description of a preferred exemplary

embodiment illustrated in the drawing, in which, in schematic illustration,

Fig. 1 shows the mechanism in plan view at the greatest eye spacing,

Fig. 2 shows the mechanism in plan view at the smallest eye spacing and

Fig. 3 shows the mechanism, seen from the front.

The two system halves 1 and 2 of the binoculars are connected to each other by means of a hollow shaft 3 such that they can be rotated and pivoted. The hollow shaft 3 is arranged fixedly in the right-hand system half 2 such that the system half 1 must also be rotated about this shaft 3. A drive shaft 4 with drive knob 5 and drive wheel 6 is mounted in the hollow shaft 3 such that it can be rotated with friction. When the knob 5 is rotated, the two eyepiece transport sleeves 9 and 12 are driven with the toothed rings 8 and 11 via the two intermediate gears 7 and 10 and, in a known way, by means of a worm drive, bring about an equally large axial displacement of the two eyepieces.

For the purpose of individual adjustment of the eyepieces, the intermediate gear 10 can be displaced in the axial direction, for example upwards, which means that the connection between drive wheel 6 and toothed ring 11 is broken and rotation of the drive wheel 6 is transmitted only to the toothed ring 8. Since the hollow shaft 3 and the gears 6 and 10 are mounted in a fixed position in the right-hand system half 2, the gears 6, 10 and 11 maintain their original position even when the left-hand system half 1 is pivoted.

Now, if the intermediate gear 7 is also mounted in a fixed position on the associated system half 1, then when this system half 1 is pivoted, it will necessarily carry out a rotational movement in the opposite direction and therefore displace the left-hand eyepiece axially via the toothed ring 8 engaging in the

intermediate gear 7 and the worm drive. In this way, the left-hand eyepiece adjustment no longer agrees with the right-hand eyepiece adjustment. It is therefore necessary to take care that this intermediate gear 7 does not cause any rotation of the toothed ring 8 when the system halves 1 and 2 are pivoted. This is now achieved in that the intermediate gear 7 is mounted in such a way that it can roll between the drive wheel 6 and the toothed ring 8. For this purpose, the intermediate gear 7 is mounted on a carrier 13, which originates from the eyepiece transport sleeve 9 and extends towards the hollow shaft 3. With its end facing the eyepiece transport sleeve, it engages around the latter in the manner of a fork, expediently in an annular groove, underneath the toothed ring 8, and can thus be pivoted about the central axis 16 of the eyepiece transport sleeve 9. With its other end, the carrier 13 interacts with a force or form fit with a control element 15, which is connected to the right-hand system half 2 rigidly in the axial direction of the hollow shaft 3. It is particularly advantageous if the carrier 13 of the control element 15 is influenced by a toothing system. The free end of the carrier 13 is given a toothing system 14 for this purpose which engages in a toothing system of a gear, for which in this case the control element 15 is formed. The two interengaging toothing systems of the carrier 13 and of the control element 15 are matched to each other in such a way that when the left-hand system half is pivoted about the hollow shaft 3, the intermediate gear 7 can roll between drive wheel 6 and toothed ring 8 without carrying the latter with it. In this way, the two eyepieces maintain their original adjustment unchanged when the two system halves are pivoted.

Patent claims:

1. Binoculars with centre drive and a gear mechanism, comprising a gear firmly connected to the drive shaft, an intermediate gear in each case and a toothed ring in each case connected to the eyepiece transport sleeves for adjusting the sharpness of the image, characterized in that at least one of the intermediate gears (7, 10) is arranged such that it can pivot about the central axis (16) of an eyepiece transport sleeve (9, 12) in such a way that it rolls loosely between the drive wheel (6) and the adjacent toothed ring (8, 11) of the eyepiece transport sleeve (9, 12) during the pivoting of one or both system halves (1, 2) of the binoculars.

2. Binoculars according to Claim 1, characterized in that the intermediate gear to be pivoted (e.g. 7) is mounted on a carrier (13) which is arranged such that it can be pivoted about the central axis (16) of the eyepiece transport sleeve (9) on the one system half (1) and which is connected by a force fit or form fit to a control element (15) arranged fixedly on the other system half (2).

3. Binoculars according to Claim 2, characterized in that the carrier (13) is formed as a pivoting lever with a fork-shaped end pointing towards the eyepiece transport sleeve (9) and, with its end, is inserted into an annular groove in the eyepiece transport sleeve such that it can rotate about the axis (16) of the latter and, at the end pointing towards the drive shaft (4) of the binoculars, is provided with a toothing system (14) which engages in the corresponding toothing system of a gear serving as control element (15), which is firmly connected to the other system half (2), coaxial with the hollow shaft (3).

German Laid-open specification 23 07 507

Binoculars

The invention relates to binoculars with centre drive and a gear mechanism, comprising a drive gear firmly connected to the drive shaft, in each case an intermediate gear assigned to each system half and, for each system half, a toothed ring meshing with the respective intermediate gear for the adjustment of the eyepiece transport sleeves, the two eyepiece transport sleeves being adjustable in the longitudinal directional together or individually as desired by means of rotation of a setting knob firmly connected to one end of the drive shaft.

Binoculars of this type are already known from DE-A 10 42 265. If, in these known binoculars, all the gears are engaged with one another, then, when the setting knob is rotated, that is to say when the drive shaft is rotated, simultaneous adjustment of the eyepieces in the longitudinal direction takes place. However, if only one eyepiece is to be adjusted, in order to achieve an adaptation to different visual acuity conditions in the eyes of the user, then the action of the setting knob or drive gear on one of the eyepiece transport sleeves is suppressed, for which purpose one of the intermediate gears is displaced in the axial direction, which breaks its engagement in the drive gear, as a result of which the rotation of the setting knob can be transmitted only to the other eyepiece transport sleeve.

These known binoculars are disadvantageous inasmuch as, in order to adjust to the respective focal lengths and to adjust the binoculars to different visual acuities in the two eyes of the user, more than one actuating element has to be operated. Thus, for example first of all, by rotating the setting knob, a uniform adjustment

or displacement of the eyepiece transport sleeves to the same extent is brought about, whereupon one of the intermediate gears is removed from the force flow of the gear mechanism and has to be kept in this axially displaced position in order to transmit the rotation of the setting knob to that eyepiece sleeve which still has to be adjusted by the drive gear via the intermediate gear assigned to it in order to reach the different adjustments of the two eyepieces. These necessary manipulations may as a rule not be carried out with one hand, however, so that the user also has to use the hand envisaged for holding the binoculars to adjust his visual aids, which, for example at sea or in a mountainous region, can lead to hazardous situations.

A further disadvantage of the known binoculars is to be seen in the fact that when the setting knob is actuated, excessive stressing off the part of the eyepiece transport system that are in thread engagement can quickly take place. In particular in the case of recent binoculars from mass production, in which many optical and mechanically important parts are kept in place only by adhesively bonded connections and in which virtually all the constituent parts consist of plastic, there is the risk that optically and mechanically important parts lead to severe damage as a result of excessive rotation, for example of the worm gear devices in the eyepiece transport systems. For example, as a result of excessive rotation of the parts driven by the gear mechanism, destruction of the threads can occur.

It is already known from FR patent 9 73 186, to arrange a drive shaft in binoculars such that it can be displaced in the axial direction between two positions with the aid of a setting knob, the setting knob in one position being connected to both transport sleeves so as to transmit movement, and in which the gears displacing the transport sleeves are arranged in

different planes in the axial direction. These known binoculars are disadvantageous inasmuch as the axially displaceable drive shaft cannot be fixed in either of its positions, so that the user is compelled to hold the drive shaft firmly in is desired position with one hand in order to prevent the drive shaft returning into the position currently not needed. As already explained, however, it is extremely disadvantageous if binoculars require the use of both hands of the user in order to operate them.

US patent 26 02 371 discloses binoculars in which a uniform displacement of both eyepieces with the aid of a cable centre drive acting on both eyepieces is provided, whereas individual adjustment of the two eyepieces by hand is made possible. These known binoculars are technically quite primitive as a result of their cable drive and, in addition, have the disadvantage that dirt and moisture can very easily penetrate into the interior of the binoculars in the region of the longitudinally displaceable eyepiece sleeves.

The invention is based on the object of constructing binoculars of the type named at the beginning in such a way that both the setting of the focal length and compensation for the visual acuity is made possible merely by actuating a single actuating element and, at the same time, taking care that the individual actuating element is safeguarded against over-rotation.

According to the invention, this object is achieved in that a drive shaft is provided which can be moved by a single setting knob in the axial direction into a first latchable position for the transport sleeve adjustment on one side and a second latchable position for the transport sleeve adjustment on both sides, and in that a rotation limiting device is provided on the drive shaft which has a movable stop connected to the drive

shaft so as to transmit movement and two stops held in a fixed location in different positions, against which the movable stop can be brought into contact so as to inhibit movement.

According to a preferred embodiment of the invention, provision can be made for a setting collar to be provided in each system half, of which the first end is in threaded engagement with the respective intermediate gears and of which the second end is in threaded engagement with the respective eyepiece transport sleeve.

Furthermore, it has proven to be advantageous that the eyepiece transport sleeves are in each case firmly connected to an outer tube, in which an eyepiece tube is guided in a sliding manner in each case. Particularly good operability of the binoculars according to the invention is also provided by an internal thread being formed in the second end of the setting sleeve, which is in engagement with an external thread formed on the eyepiece transport sleeve.

In order to hold the drive shaft in the first or second latchable position, it has proven to be advantageous for mutually parallel annular grooves to be formed in the surface of the drive shaft, which interact with two latching springs in fixed locations.

The rotation limiting device is preferably provided on the setting knob, the movable stop then being fixed to a nut disc which, as the setting knob is rotated, can be moved with the aid of a driver in the vertical direction about a threaded bush pushed onto the drive shaft, until it makes contact with one of the fixed stops. In this case, it has proven to be advantageous that the threaded bush is fixed to the underside of the binocular housing with the aid of a screw serving as a stop and that the other fixed stop is formed in a disc

which is fixed to the lower end of the threaded bush. Furthermore, the movable stop can advantageously be formed as a double-sided stop.

The technical progress which can be achieved with the aid of the binoculars according to the invention is primarily to be seen in the fact that the drive shaft which can be displaced axially with the aid of a single setting knob can be fixed both in its first position for the transport sleeve adjustment on one side and in a second position for the adjustment of the transport sleeves on both sides, so that the drive shaft can reliably be prevented from returning into the unnecessary position. The fact that a rotation limiting device is provided on the binoculars according to the invention ensures that the drive shaft experiences an excessively great displacement axially neither in one direction nor in the other.

Exemplary embodiments of the invention are illustrated in the drawing and will be explained in more detail in the following. In the drawing:

Fig. 1 shows a view, illustrated partly in section, of a first embodiment of the invention with a common rotary knob for the focusing and visual acuity compensation, here in the focusing position,

Fig. 2 shows a view corresponding to Fig. 1 which shows the rotary knob in a position for the visual acuity compensation,

Fig. 3 shows an enlarged sectional view of the rotary knob, from which the rotation limiting device can be seen.

As Fig. 1 reveals, a rotatable drive shaft 31 forms a pivot axis along the centre of the binocular housing. At one end, this drive shaft bears a setting knob 32 and, at the other end, a spur gear 30. The spur gear 30 seated at the eyepiece end of the shaft 31 is in

engagement with a left-hand and a right-hand spur gear 40 and 50, respectively, arranged such that they can rotate on the relevant system halves. The left-hand spur gear 40 is in engagement with a toothed ring at the lower end of a setting collar 41. This has an internal thread for the engagement of an eyepiece transport sleeve 42, which is in turn firmly connected to an outer tube 45 of the left-hand eyepiece. An eyepiece tube 44 guided in a sliding manner in a cylindrical guide 43 on the left-hand half of the housing is fixed to the outer tube 45. The eyepiece tube 44, the guide 43, the eyepiece transport sleeve 42, the setting collar 41 and the eyepiece outer tube 45 are all arranged concentrically with one another. The right-hand eyepiece has the same construction as the left-hand one. An eyepiece tube 54 containing a lens system 7y, 8y is fixed to an outer tube 55, at least by its upper end. The left-hand side is in turn fixed to an eyepiece transport sleeve 52, of which the external thread is in engagement with the internal thread of a setting collar 51. This setting collar 51 can be rotated about the eyepiece tube 54 and is in engagement with the right-hand spur gear 50 via a toothed rain formed at the lower end. The eyepiece transport sleeve 52 can be displaced in a sliding manner on a cylindrical guide 53, which means that the eyepiece tube 54 can be moved inwards and outwards along the optical axis.

The drive shaft 31 bearing the setting knob 32 at the other end can be displaced by a certain amount in the axial direction. Fig. 1 shows the setting knob and therefore the shaft 31 in the lower end position, in which the spur gear 30 seated at the other end of the shaft is in engagement with the two lateral actuating gears 40 and 50, so that both eyepieces can be moved inwards and outwards in the same direction and over the same distance in each case in the event of rotation of the shaft.

Fig. 2 shows binoculars according to the invention in an operating position that is changed with respect to Fig. 1, in which the drive gear 30 is in the upper end position and therefore in engagement only with the right-hand spur gear 50. Likewise, the setting knob 32 is also in its upper end position. The upper and the lower end position of the setting knob and of the gear 30 serving as a drive gear are determined by a detent on the shaft 31 (Fig. 3). In its circumferential surface, the shaft 31 has to mutually parallel annular grooves 31a, 31b for the engagement of latching springs 39a, 39b, which are arranged opposite the circumferential surface. By means of the engagement of the two latching springs 39a, 39b in one or other of the annular grooves 31a and 31b, respectively, the shaft 31 can optionally be fixed in one of two positions. In this case, one corresponds to the lower and the other position corresponds to the upper of the end positions shown in Figs 2 and 3. In the latter position, the drive gear 30 is in engagement only with the right-hand spur gear 50, so that, in the event of rotation of the setting knob 32, only the right-hand eyepiece tube 54 is moved inwards or outwards. The visual acuity compensation is also brought about here by the setting knob 32 being brought into the upper end position and then rotated about its axis.

In order to adjust the focal length, the setting knob 32 is moved into the lower end position shown in Fig. 2 and then rotated about its axis. As a result, the two lateral spur gears 40 and 50 are driven in order to displace both eyepieces in the same direction and over the same distance in each case in order to adjust the focal length.

In order to avoid overloading or over-rotation of the movement device, it is expedient to limit the rotational movement of the shaft 31 in both directions. For this purpose, the setting knob 32 is provided with

a limiting device. One such is illustrated in particular in Fig. 3. The setting knob 32 is fixed at the lower end of the shaft 31 by means of a screw 33 and, in on the inside, contains a driver 32a, which extends with a part axially along the shaft 31. A threaded bush 34 having an external thread 34a is pushed onto the lower end of the shaft 31 projecting from the housing of the binoculars. It has a fixing flange 37, with which it is fixed to the underside of the housing by means of a screw 37a passing through the said flange. A disc nut 35 that is in thread engagement with the threaded bush 34 bears a projecting double stop 36 and is pierced by a hole 35b to accommodate the part of the driver 32a running axially. For the engagement with the thread 34a of the bush 34, the disc nut 35 has a threaded hole 35a. At the lower end of the threaded bush 34 there is seated a stop disc 38, which is fixed thereto by means of a clamping screw 38b and bears a limiting stop 38a on the upper side. The distance of the stop 38a from the axis of the shaft 31 is equal to that of the head of the screw 37a from the shaft axis and, in addition, is equal to that of the double stop 36. The head of the screw 37a thus forms a stop corresponding to the limiting stop 38a, on which the double stop 36 can be brought into contact with one side or the other. When the setting knob 32 is rotated, the disc nut 35 is driven around the threaded bush 34 by the driver 32a at the same time and, as a result, moves along the latter and along the shaft 31 until the double stop 36 comes into contact with one or the other limiting stop 37a or 38a. In this way, the rotational movement of the setting knob 32 is limited on both sides.

Patent claims:

1. Binoculars with centre drive and a gear mechanism, comprising a drive gear firmly connected to the drive shaft, in each case an intermediate gear assigned to each system half and, for each system half, a toothed ring meshing with the respective intermediate gear for the adjustment of the eyepiece transports means, the two eyepiece transport sleeves being adjustable in the longitudinal directional together or individually as desired by means of rotation of a setting knob firmly connected to one end of the drive shaft, characterized in that that a drive shaft (31) is provided which can be moved by a single setting knob (32) in the axial direction into a first latchable position (31a, 39) for the transport sleeve adjustment on one side and a second latchable position (31b, 39) for the transport sleeve adjustment on both sides, and in that a rotation limiting device (34 to 38) is provided on the drive shaft (31) which has a movable stop (36) connected to the shaft (31) so as to transmit movement and two stops (37a, 38a) held in a fixed location in different positions, against which the movable stop can be brought into contact so as to inhibit movement.

2. Binoculars according to Claim 1, characterized in that a setting collar (41, 51) is provided in each system half, of which the first end is in threaded engagement with the respective intermediate gears (40, 50) and of which the second end is in threaded engagement with the respective eyepiece transport sleeve (42, 52).

3. Binoculars according to Claim 1 or 2, characterized in that eyepiece transport sleeves (42, 52) are in each case firmly connected to an

outer tube (45, 55), in which an eyepiece tube (44, 54) is guided in a sliding manner in each case.

4. Binoculars according to Claim 3, characterized in that an internal thread is formed in the second end of the setting sleeve (41, 51), which is in engagement with an external thread formed on the eyepiece transport sleeve (42, 52).

5. Binoculars according to Claim 4, characterized in that the latch is formed from mutually parallel annular grooves (31a, 31b) formed at a distance from each other in the surface of the drive shaft (31), and two latching springs (39a, 39b) in fixed locations.

6. Binoculars according to at least one of Claims 1 to 5, characterized in that the rotation limiting device (34 to 38) is provided on the setting knob (32).

7. Binoculars according to at least one of Claims 1 to 6, characterized in that the movable stop (36) is fixed to a nut disc (35) which, as the setting knob (32) is rotated, can be moved with the aid of a driver (32a) in the vertical direction about a threaded bush (34) pushed onto the drive shaft (31), until it makes contact with one of the fixed stops (37a, 38a).

8. Binoculars according to Claim 7, characterized in that the threaded bush is fixed to the underside of the binocular housing with the aid of a screw serving as a stop (37a) and in that the other fixed stop (38a) is formed in a disc (38) which is fixed to the lower end of the threaded bush (34).

9. Binoculars according to Claim 8, characterized in that the movable stop (36) is formed as a double-sided stop.